The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

REC'D 0 7 DEC 2004
WIPO PCT

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., P.L.C. or PLC.

Registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated   25 November 2004

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH
RULE 17.1(a) OR (b)

BEST AVAILABLE COPY

Patents Form 1/77

Patents Act 1977
(Rule 16)

The
Patent
Office

06NOV03 E049826-3 000056
P01/7700 0.00-0325859.7

1477

Request for grant of a patent
*(See the notes on the back of this form. You can also get an
explanatory leaflet from the Patent Office to help you fill in
this form)*

The Patent Office

Cardiff Road
Newport
South Wales
NP9 1RH

1. Your reference	P36191GB/GVR

2. Patent application number *(The Patent Office will fill in this part)*	0325859.7	- 5 NOV 2003

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Ricardo UK Limited
Bridge Works
Shoreham-by-Sea
West Sussex, BN43 5FG

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom   8598948001

4. Title of the invention

METHOD OF TRANSMITTING MONITORING INFORMATION

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Kilburn & Strode
20 Red Lion Street
London
WC1R 4PJ

Patents ADP number *(if you know it)*   125001 ✓

	Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number			

	Number of earlier application	Date of filing *(day / month / year)*
7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application		

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*
a) *any applicant named in part 3 is not an inventor, or*
b) *there is an inventor who is not named as an applicant, or*
c) *any named applicant is a corporate body. See note (d))*

YES

Patents Form 1/77

Patents Form 1/77

9. Enter the number of sheets for any of the
   following items you are filing with this form.
   Do not count copies of the same document

Continuation sheets of this form

Description   6

Claim (s)   2

Abstract   -

Drawing (s)   3 + 3   csv

10. If you are also filing any of the following,
    state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right
to grant of a patent *(Patents Form 7/77)*

Request for preliminary examination
and search *(Patents Form 9/77)*   1

Request for substantive examination
(Patents Form 10/77)

Any other documents
(please specify)

11.   I/We request the grant of a patent on the basis of this application.

Signature   Date   5.11.03

12. Name and daytime telephone number of
    person to contact in the United Kingdom

Gwilym V. Roberts
Tel: 020 7539 4200

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

1

METHOD OF TRANSMITTING MONITORING INFORMATION

The invention relates to a method of transmitting monitoring information for example data relating to tests performed on vehicles or vehicle components in a
5   test cell.

Test cells are used for real-time vehicle or vehicle component testing for example in relation to vehicle engines, vehicle chassis, vehicle transmissions or other vehicle components.

10

In the case, for example, of vehicle engines, a test development engineer defines a test to be carried out on an engine, for example identifying the parameters that are to be tested and the testing regime that may define a duty cycle through which the engine is run.

15

During testing the engine is run in a test cell such as a specifically designated testing room, according to the duty cycle, and control data and engine performance output data is continually controlled, managed and monitored in real time. The test conditions and outputs are controlled by one or more
20   computers. For example different computers may have different assigned tasks such that one may control the physical inputs to the engines such as throttle and engine load, another the control parameters of an engine management system controlling the engine such as ignition timing and fuel injectors and another will provide data acquisition in terms of the performance outputs from the engine
25   such as stress, strain, temperature, torque or emissions as appropriate. Each computer will have one or more applications with their own graphical user interface (GUI) allowing monitoring and control of the various test parameters.

Generally, the computers will be physically adjacent to the test cell for health and safety reasons allowing direct physical intervention in the test if necessary. Control and monitoring of the tests is carried out by one or more test technicians at the test site. However, in some instances it is desirable for a third party at a remote location to have the ability to review the test. For example where the on-site test technician recognises that the test is not running correctly it may be necessary to contact the remote test development engineer to assess whether the test can be modified appropriately.

In one known remote monitoring system, output data from the vehicle or vehicle component in the test cell is transmitted to a client terminal at a remote site as monitoring information. The data is processed at the remote client and represented on a remote client computer. A problem with the known system is that this requires significant amount of data to be transmitted in real time which can give rise to bandwidth difficulties. In addition sophisticated software is required at the client terminal to interpret and represent the received data in a user readable form.

The invention is set out in the claims.

Embodiments of the invention will now be described by way of example with reference to the drawings of which:

Fig. 1 is a block diagram showing the principle components of an apparatus for remote monitoring of test data: and

In overview, data collated during testing or monitoring of for example an engine is logged and processed at a computer such as a local or host terminal and represented on a monitor or user screen by a graphical user interface (GUI). In order to allow remote access, instead of transmitting the raw data received from the control processor or engine sensors or outputs, an image of the user's screen is transmitted to the remote client. This can be done, for example, by transmitting the image definition from the local computer directly to the remote client computer monitor such that the user's screen is mirrored on site and at the remote terminal. In particular a human viewable representation signal can be transmitted, for example that generated or received by the graphics card. As a result all information available to the local technician is also available remotely, allowing real-time collaboration between the test technician and development engineer. Significantly less bandwidth is required to achieve this because of the approach adopted, and it is not necessary to load sophisticated interpretation software at the remote client.

In an optimisation, however, additional software can be loaded at the remote client to allow further analysis of the data represented on the screen. Yet further, control of the test can be slaved to the remote client terminal.

Referring to Fig. 1 a test cell designated generally (10) includes an engine (12) having a control input (14) and a performance data output (16). A computer (21) including a processor (18) and a graphics card (19) which can be any appropriate computer such as a personal computer (PC) or other processor controls testing of the engine by sending control input (14) and monitoring performance via performance data outputs (16) from respective test cells or

engine sensors (not shown). Although a single computer is shown it will be appreciated that multiple processors can be used both for sending control information and receiving performance data. For example respective individual processors can be used for controlling the engine directly and also for

5   controlling the engine management system (not shown). Similarly separate processors can receive performance data of different types. As a result real time control and monitoring of the engine (12) in a test cell (10) can be carried out. The processor (18) further outputs an image signal to the graphics card (19). On the basis of the received signal the graphics card produces an image signal

10   to a local monitor (20) showing relevant control and performance data to an on-site test technician.

In order to enable remote monitoring or control of the test cell (10) the computer system and processor (18) also transmits a human viewable

15   representation signal to a remote computer (22). The signal can be transmitted over any appropriate medium (26) such as a telephone line, LAN, private network or the internet, or any other appropriate transmission medium. The signal can be, for example, the image signal received by the graphics card (19) from the processor (18), or the image signal from the graphics card (19).

20

It will be seen that any appropriate computer showing relevant information can be accessed appropriately. For example computers showing basic engine control data, engine management system or engine control unit control data or engine performance data such as combustion analysis or emissions can be

25   displayed on the local display or at the remote client computer display. In

acquisition information such as engine speed, torque, power, pressure, fuel rate and so forth. Fig. 2B shows a combustion analysis where cylinder pressure traces are provided for each cylinder and engine cycle together with cylinder knock amplitude for each cylinder across multiple engine cycles. Of course any

5   other appropriate screen can be represented. In addition the computer can include control aspects such as clickable screen buttons allowing resetting of the various sensors, running of additional tests and so forth allowing the test technician to vary parameters of the test.

10   Accordingly, by sending an image signal directly from the computer memory (21) to the remote monitor (22) it will be seen that all of the relevant information available to the technician can also be available to the test development engineer. Yet further control of the test can be slaved to the remote monitor for example under the control of a button on the test

15   technician's screen such that the test can be controlled remotely as well.

It will be appreciated that the method and apparatus described can be implemented in any appropriate form. Any appropriate computer system such as a Windows ™ based PC (operating systems would include Windows 98,

20   Windows NT, Windows 2000) can be used both locally and remotely where the screen image is taken directly from the host PC's memory and transported down the network, where it is interpreted by the remote computer and then displayed as a screen image, or taken from the graphic (video) card. Any appropriate testing package can be used as well, such as

25   any Windows ™ based real-time testing software. It will be appreciated that the invention extends to any type of vehicle test or monitoring including performance tests and vehicle calibration and that generally the term

"monitoring" in relation to vehicle or other information embraces test information or data, monitoring information or data and other measures for obtaining real-time information concerning an operation or process for example data such as computer generated data representing progress or performance

5   thereof.

The image can be transmitted over any appropriate network and if a public network such as the internet is used then any appropriate security protocol can be added on, such as HTTPS. At the remote client and no dedicated additional

10   software need be incorporated; any appropriate internet browser, for example, can be used to allow display of the user screen remotely. Similarly the ability to control the test from the remote location can be slaved using any appropriate software and protocols. Furthermore the screen could be transmitted in any alternative manner, for example by capturing screen shots and transmitting

15   them at an appropriate refresh rate. The data received at the remote client whether from the graphics card or any other means is pure image data but can be reversed compiled with appropriate software installed at the remote client. It will further be noted that both the test technician and test development engineer can be at the same or different remote sites allowing testing to be controlled and

20   monitored purely remotely.

CLAIMS

1. A method of transmitting monitoring information from a monitoring site to a remote site, comprising receiving monitoring information at the monitoring site, processing the monitoring data to form a human viewable representation signal and transmitting the human viewable representation signal to a remote site.

2. A method as claimed in claim 1 further comprising receiving the human viewable representation signal at a remote site and displaying the signal as a human viewable representation.

3. The method as claimed in claim 2 further comprising transmitting control instructions from the remote site to the monitoring site.

4. The method as claimed in claim 2 or claim 3 further comprising processing the human viewable representation at the remote site to derive monitoring data.

5. The method as claimed in any proceeding claim in which the monitoring information is processed to form a human viewable representation signal by computer . .

6. A method of receiving monitoring information from a monitoring site at a remote site comprising receiving, at the remote site, a human viewable representation signal representing the monitoring information and displaying the human viewable representation of that monitoring signal.

7.   The method as claimed in any preceding claim in which the monitoring information is test information for example vehicle or vehicle component monitoring data.

5

8.   A computer program comprising a set of instructions configured to implement a method as claimed in any of claims 1 to 7.

9.   A computer configured to run under the instructions of a computer

10   program as claimed in claim 8.

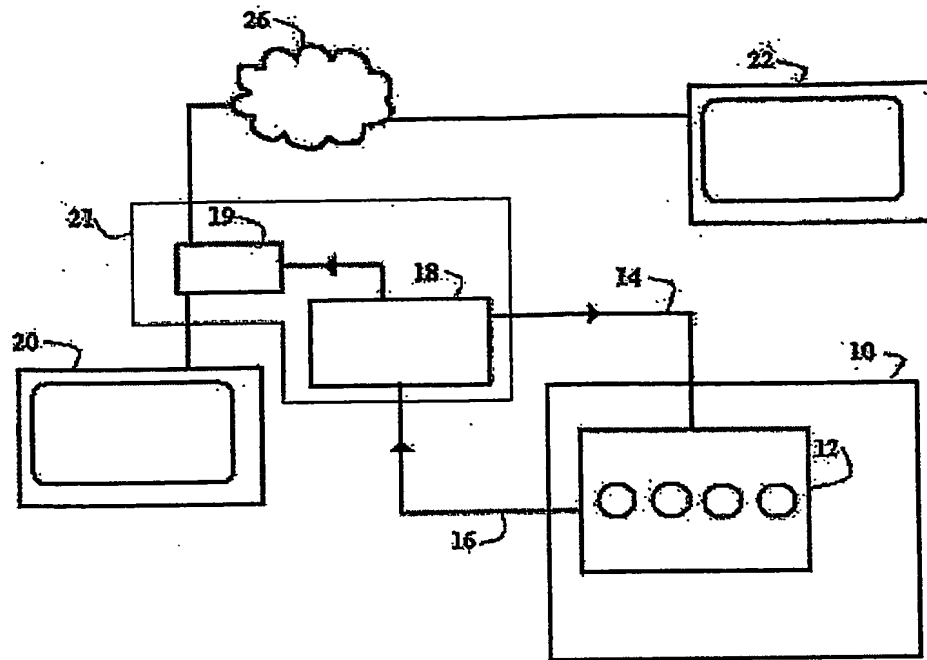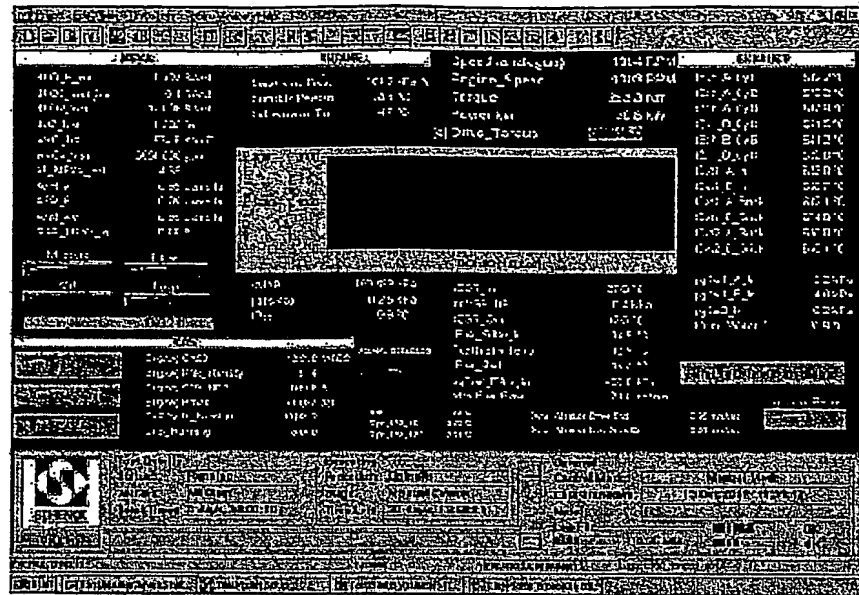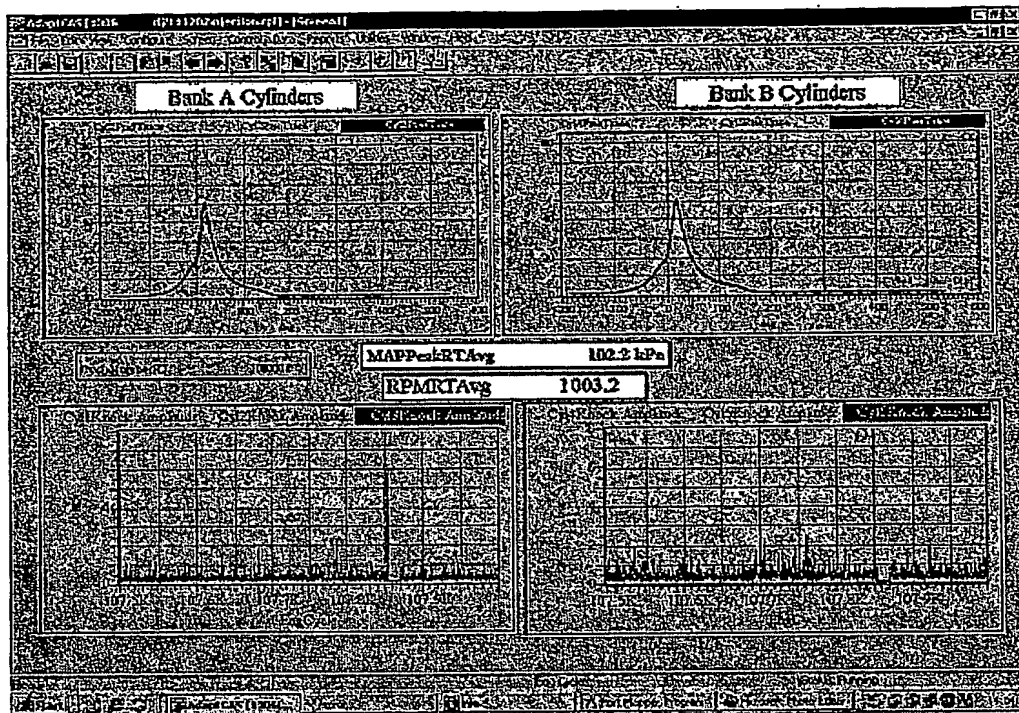10.   A computer readable medium storing a computer program as claimed in claim 8.

FIG. 1

Fig 2a

Fig. 2b